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Isabelle Chartier, N. Mermilliod, R. Romero, R. Moncorge, J. Aubert. COMPARATIVE LASER PERFORMANCES OF SEVERAL Nd DOPED MATRICES UNDER DIODE PUMPING. Journal de Physique IV Proceedings, 1991, 01 (C7), pp.C7-426-C7-426. 10.1051/jp4:19917114 . jpa-00250763

HAL Id: jpa-00250763

<https://hal.science/jpa-00250763>

Submitted on 1 Jan 1991

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**COMPARATIVE LASER PERFORMANCES OF SEVERAL Nd DOPED MATRICES
UNDER DIODE PUMPING**

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The laser performances under diode pumping of well known materials such as YAG ($\text{Y}_3\text{Al}_5\text{O}_{12}$), YLF (YLiF_4) or YVO_4 have been widely investigated all over the world ; but they are highly dependant upon experimental conditions that are always different from place to place, and it is finally difficult to have a clear idea of the real performances of those materials. We have thus chosen to test many different crystals such as GGG ($\text{Gd}_3\text{Ga}_5\text{O}_{12}$), GGG(Ca,Zr), LMA ($\text{LaMgAl}_{11}\text{O}_{19}$), ASN [1], YVO_4 and of course YAG and YLF, but strictly in the same experimental conditions.

Our work has focused on three points :

- 1) - The sensitivity of the laser output to variations of the pump wavelength : we found that if YVO_4 , LMA and GGG(Ca,Zr) are rather unsensitive to such variation, whereas it drastically affects the performances of YAG and YLF.
- 2) - The laser threshold have been determined for various mirror transmissions, which led to an estimation of the optical losses and of the emission cross section, that were found to be the same or sometimes (LMA) higher than the litterature values.
- 3) - The slope and optical efficiencies of all those materials have also be measured for different mirror transmissions T. It comes out that, as predicted by theory, the slope efficiencies of YAG, YLF or GGG were increasing monotonically with T. But it was a surprise to observe that the slope efficiencies of LMA, GGG(Ca,Zr), ASN where going through a maximum for $T \approx 4\%$ and then decreasing rapidly when T increased. Such a behaviour can be explained by taking into account the inhomogenous broadening present in the fluorescence bands in those disordered materials.

[1] See the paper of S. Alabranche, D. Vivien and col. in the same session.